LIBRARY OF THE
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

629.13
1ℓ6a
no.11-24

The person charging this material is responsible for its return to the library from which it was withdrawn on or before the **Latest Date** stamped below.

Theft, mutilation, and underlining of books are reasons for disciplinary action and may result in dismissal from the University.

UNIVERSITY OF ILLINOIS LIBRARY AT URBANA-CHAMPAIGN

NOV 19 1973
AUG 3 1975
JUL 12 1975
FEB 16 1979
JAN 27 1979
DEC 30 1979
MAR 2 1980
BUILDING USE ONLY
MAR 2 1980
DEC 10 1982
FEB 27 1990
JUN 16 1994
MAY 26 1994
UIC FEB 23 '96
FEB 07 1996
AUG 29 2008

L161—O-1096

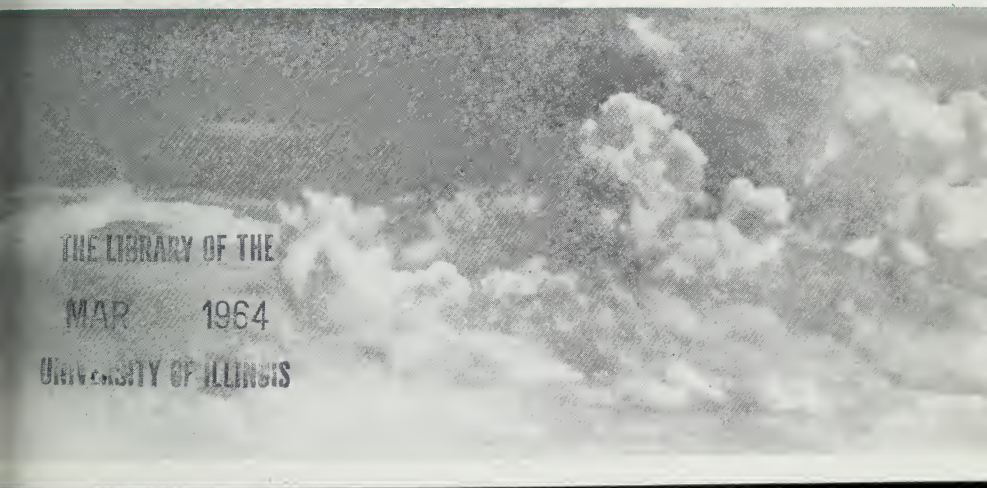
Digitized by the Internet Archive
in 2013

http://archive.org/details/aerospaceeducati24john

29.13
l62a
no.24

AERONAUTICS BULLETIN NO. 24

Aerospace Education Workshops and Institutes



THE LIBRARY OF THE
MAR 1964
UNIVERSITY OF ILLINOIS

UNIVERSITY OF ILLINOIS BULLETIN

UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION

UNIVERSITY OF ILLINOIS INSTITUTE OF AVIATION

Leslie A. Bryan, Ph.D., LL.B., Director

James M. Hancock, A.B., Editor

UNIVERSITY OF ILLINOIS BULLETIN: Volume 61, Number 46; January, 1964. Published nine times each month by the University of Illinois. Entered as second-class matter December 11, 1912, at the post office at Urbana, Illinois, under the Act of August 24, 1912. Office of Publication, 49 Administration Building (West), Urbana, Illinois.

The Library of Congress catalog entry for this publication appears at the end of the text.

Aerospace Education Workshops and Institutes

By RAYMOND J. JOHNSON

Foreword

Educational leaders are becoming increasingly aware of the challenge of the aerospace age and are giving formal recognition to the need for introducing aerospace concepts into the classroom. How to orient the classroom teacher who has not had formal training in the new concepts is often a problem for the school administrator. It is as an aid toward a solution of the problem that this monograph is directed.

The author, Raymond J. Johnson, Ed.M., has had extensive experience in the field of aerospace education as the Executive Officer of the Illinois Wing of the Civil Air Patrol and as a guest lecturer in the aerospace field at several colleges and universities. He has also been associated with the Illinois Aerospace Institute type of program of which he writes. His observations, experience, and conclusions concerning the various types of programs are now made available through the text and charts of this bulletin. The Institute of Aviation is pleased to publish the information, especially as a guide for those who seek comprehensive and concise knowledge on possible procedures of orienting teachers in the ever-changing field of aerospace.

In this monograph, as in all similar publications of the Institute, the author has had complete freedom to express his opinions, with the understanding that he assumes full responsibility therefor.

January 1964 LESLIE A. BRYAN, *Director*

629.13
IRGa
no. 24

Contents

Introduction

The world today is experiencing a technological revolution which is having a dynamic impact economically, sociologically, and politically. This explosive expansion of scientific knowledge and technology is creating an influence as significant as that of the industrial revolution of the last century or any of the other great revolutions in history which have shaped the development of civilization.

Never before has mankind been able to make so many important changes in so many fields at such a rapid rate. It is this spectacular rate of change, rather than the character of the change itself, which threatens to produce a rapidly widening gap in communication between the scientists and engineers and the laymen of our society.

Concern has been expressed over this widening gulf of noncommunication as it becomes increasingly apparent that the overwhelming majority of our adult population have had little formal training in science and that, in effect, they are scientifically illiterate. Most laymen do not understand that modern science is more than new knowledge — it is a way of thinking and working.

The President's Science Advisory Committee in 1959 concluded in its report that all citizens of our modern society must acquire a reasonable understanding of science and technology. This is a requirement

for intelligent support of and participation in programs designed to exploit the great advances for the benefit of our free society. The report further pointed out that there is no way of turning back the clock or stopping scientific advance.

Aerospace activity, with its emphasis on the long-range program of space exploration, has been a major catalyst in the general advancement of science and technology. The term "aerospace" is commonly defined as the total expanse extending upward and outward from the surface of the earth. It has also been generally used to identify activities related to either atmospheric or space flight, thereby recognizing their inter-relationship. The present period in man's history has, in fact, been accepted as the aerospace age. A significant proportion of our gross national product is now channeled into aerospace activity.

Space exploration is challenging the full capability of this nation's intellectual and industrial capacity. New aerospace technologies have brought about new industrial concepts of doing business. Major aerospace programs now require a national coordinated effort of thousands of organized projects. Often, almost unbelievable creative achievements are demanded.

The challenge to the educational field in this aerospace age is almost overwhelming in its implications and opportunities. The emergence of the electronic computer has provided a vital new tool enabling man to make fuller use of his intellect, just as the first crude iron age tools extended the use of his hands. New concepts of the inter-relationship of all areas of knowledge are emerging, bringing about an increasing need for dynamic education. Children must be prepared for jobs in their adulthood that do not yet exist. In addition, they must be prepared for the responsibility of citizenship in the more complex world of tomorrow.

Aerospace education is rapidly becoming recognized as an emerging branch of general education. Dr. Mervin K. Strickler, Jr., now Chief of the Aviation Education Division of the Federal Aviation Agency, has defined aerospace education as that branch of general education concerned with communicating knowledge, skills, and attitudes about aerospace activities, and the total influence of air and space vehicles upon society. Aerospace education must also be distinguished from those branches of special education known as aeronautical and/or astronautical education, which are concerned with the training of specialized aerospace workers. Aerospace education may be formal or informal; that is, it may be organized in school and college curricula or it may be undertaken by agencies devoted to informal rather than to formal education. It is the purpose of this monograph to survey the various types of approaches used to orient teachers in aerospace

education, to describe the plan used in the Illinois Aerospace Institute, and to make available experience and recommendations for those who may desire information on aerospace education.

Present Approaches to the Orientation of Teachers in Aerospace Education

An investigation of the approaches commonly used to provide aerospace education for teachers reveals that the terminology used in describing the various techniques is not yet sharply defined. Since the terminology is frequently used interchangeably, it is desirable to group aerospace education training activities arbitrarily into six general categories. These six broad divisions are identified as follows:

1. Articles, Materials, and Services
2. Short Programs
3. Seminars and Conferences
4. Institutes
5. Extension Courses
6. Workshops

The above categories have some overlapping and there is considerable latitude within each of them. However, through representative examples, it is possible to define, describe, and compare the categories.

ARTICLES, MATERIALS, AND SERVICES

This category is the most difficult to define, since it is extremely broad in scope, form, and purpose. In general, it includes published articles and other materials which are easily available to the teacher. They may be read and/or used as self-contained explanatory items. Examples are:

1. *Motivational articles* — magazine stories and specially prepared leaflets or pamphlets. They are designed to stimulate interest and awareness and to motivate the teacher toward an understanding of aerospace education objectives.
2. *Definitive publications* — explanations and definitions of aerospace education *per se.*
3. *Curriculum guides* — guide lines for teaching aerospace education in a correlative manner.
4. *Course outlines* — a general sketch prepared for either a specific aerospace science course or for other general courses at the high school or college level.

5. *Units* — a section to include limited aerospace concepts to be developed along with activities and materials that are recommended for specific grades and/or topics. A bibliography is generally included as a feature of a unit.
6. *Source books and bibliographies* — information on aerospace subjects pertinent to use in the classroom. They also identify resources and/or publications available to the teacher.
7. *Classroom materials* — pamphlets, charts, pictures, and informative articles which are useful for both teacher orientation and classroom activities.
8. *Films* — a visual aid, available in a vast variety, ranging from colorful, nontechnical filmstrips to complex technical subject presentations.

The aerospace education centers which exist throughout the country are not precisely defined as to their nature or scope of activity. They are usually associated with an organization (private, governmental, educational, or military) which has a related interest in aerospace education. They will usually provide the teacher with one or more of the above items, either free or at a minimal cost. Often additional assistance is available and may include displays, personalized information, counseling services, and the maintenance of a materials library. Some centers have speakers available, and a few sponsor formal teacher-training programs.

SHORT PROGRAMS

Short programs are one- or two-hour presentations. They generally serve as a motivational introduction to aerospace education. At other times they inform on some specific phase of aerospace activity. Short programs may be comprised of either speakers or a demonstration lecture which includes slides or films. This type of orientation may be a single section of a larger meeting or the entire program for a specific meeting. The following are examples of single-presentation aerospace education programs.

Sponsor	*Program*
An Area Science Teachers Conference	Survival in Space
A University's Annual Education Conference	Defining the Aerospace Age
A Faculty Meeting	Aerospace Concepts for Elementary Teachers
An Educational Fraternity Meeting	Aerospace Impact Upon Education

Sponsor	*Program*
An Economic Education Conference for School Administrators	Economics of the Aerospace Age
A Social Studies Teachers Banquet	NASA Space Mobile Demonstration Lecture
A Superintendents Round-Table Meeting	Educational Implications of Aerospace

Suitable topics are almost unlimited for the short program, and there is a broad range of sponsoring organizations. If the program is lengthened or multiple topics are included, greater selectivity of the subject matter must be exercised.

SEMINARS AND CONFERENCES

Seminars and conferences are usually from two to six hours in duration and vary in nature and purpose. They should be of sufficient length to be quite informative on one subject area or to permit the coverage of several topics. Examples in this category are as follows:

Typical Aerospace Seminar Program Schedule — **6 hours**

INTRODUCTORY REMARKS — *(10 min.)*

ADDRESS:

THE MEANING OF AEROSPACE EDUCATION — *(30 min.)*

Coffee Break

PANEL DISCUSSION:

PROGRAMS FOR AEROSPACE EDUCATION — *(90 min.)*

panel: National Aeronautics and Space Administration Representative
Federal Aviation Agency Representative
National Aerospace Education Council Representative
Civilian Airline Representative
Civil Air Patrol Representative
USAF Representative

Luncheon — *(90 min.)*

ADDRESS:

TRAINING THE ASTRONAUTS

PRESENTATIONS:

What's New in the Aerospace Field — *(30 min.)*

New Look in Aeronautical and Lunar Charts *(30 min.)*

Break

The Manned Space Flight Program *(30 min.)*

The Supersonic Air Transport *(20 min.)*

BRIEFING:

MATERIALS AND TEACHING AIDS AVAILABLE TO TEACHERS *(20 min.)*

Adjournment

Typical National Aerospace Education Conference Schedule

First Day

9:00–10:00 a.m.	Registration
10:00–11:00	Conference Opening Remarks Address: THE SIGNIFICANCE OF AEROSPACE EDUCATION
11:00–12:00	A Review of the National Aeronautics and Space Administration's Programs
12:30– 2:00 p.m.	Luncheon Address: GENERAL AVIATION TODAY AND TOMORROW
2:30– 5:30	Visit to Local Aerospace Facility

Second Day

9:00–10:00 a.m.	Address: NEED FOR SCIENTIFIC LITERACY
10:00–12:00	*Section Meetings* Aerospace Workshops In-Service Teacher Training Aviation in the High School Elementary School Aerospace Education Curricula International and Economic Aspects of the Aerospace Age Current Developments in Space
12:30– 2:00 p.m.	Luncheon Address: GROWING INTEREST IN SPORT AVIATION
2:15– 5:00	*Section Meetings Continued*

6:00– 9:00	Reception and Banquet Awards Program Address: America's Airpower

Third Day

8:00–12:00 n.	Visit to Local Aerospace Facility Meetings of Committees and Representatives of Related Organizations

Adjournment

Many organizations sponsor the seminar/conference type of program outlined on the previous pages, e.g., Air Force Association, Civil Air Patrol, National Aeronautics and Space Administration, National Aerospace Education Council, National Education Association, National Geographers Association, and colleges and universities. Such a program may be for general orientation or it may have a specific purpose such as workshop organization and planning.

Trips and visitations to aerospace facilities, which may also be classified in the above category, are both informative and motivational in nature.

INSTITUTES

An institute is usually from six to fifteen hours in duration and requires from two to six separate sessions. It covers a more comprehensive range of subjects than either the conference or seminar. An institute also usually includes experience activities such as an orientation flight or a tour of an aerospace facility. College-level credit may be given for successful completion of the work offered in an insitute. Individual projects are required in some institutes and handout materials are generally made available to the participants.

Typical Aerospace Institute Schedule **12½ hours**
(conducted on an Air Force base)

Friday

First Session (2 hrs.)

Institute Overview
Purpose and Objectives of Illinois Aerospace Education Committee
What Is Aerospace Education?
Curriculum Objectives

Luncheon (no formal presentation)

Second Session (3½ hrs.)

Briefing on Military Air Transport Service
Tour on MATS Command Post
Tour of Base Operations Area and Flight Line
Application and Evaluation Discussion

Dinner

Third Session (2 hrs.)

Air Weather Service Briefing

Saturday

Fourth Session (3 hrs.)

Resources for Aerospace Education
Industry Briefing on Manufacturing of Aerospace Vehicles
National Aeronautics and Space Administration's
Man-in-Space Program

Luncheon

Social Implications of Aerospace Age Transportation
Summation and Critique

EXTENSION COURSES

Extension courses are generally scheduled for one meeting each week over a period of eight to eighteen weeks. In most cases these courses are equivalent to college-level extension courses and credit is offered to those who successfully complete the work. A project or paper is normally required. The course is quite comprehensive and covers many aspects of aerospace activities and aerospace education techniques; related aerospace experience activities are almost always included. Educational television has been used successfully for this type of in-service training. A college or university generally sponsors this form of training for local school systems.

Typical Aerospace Extension Course Schedule **29 hours**
(conducted in local school building under direction of a college or university)

first week	Education in the Aerospace Age	*(2 hrs.)*
second week	Aircraft in Flight	*(2 hrs.)*
third week	Power for Flight	*(2 hrs.)*
fourth week	Airports, Airways, and Electronics	*(2 hrs.)*
fifth week	Navigation and the Significance of Weather	*(2 hrs.)*
sixth week	Physiological Training for Aircrews	*(2 hrs.)*
seventh week	Civil Air Patrol and USAF Missions	*(2 hrs.)*

eighth week	Interpreting the Impact of the Aerospace Age	*(2 hrs.)*
ninth week	The Federal Government and Civil Aviation	*(2 hrs.)*
tenth week	Career Needs in Aerospace	*(2 hrs.)*
eleventh week	Problems of Airpower	*(2 hrs.)*
twelfth week	Orientation Flight Experience and Tour of Local Airport	*(3 hrs.)*
thirteenth week	Tour of Nearby Air Force Base Presentation of Certificates	*(4 hrs.)*

WORKSHOPS

Workshops are regular credit courses sponsored by a college or university during the summer session. These programs are from two to six weeks in length and are comprehensive in content. They are designed to provide an adequate aerospace education background so that a teacher will be able to conduct successfully the classroom's aerospace activities. Lectures are supplemented by field trips, flight experiences, and a wide variety of printed materials. A personal project in aerospace education is generally required for successful completion of the course. If commuting is not possible, workshop participants live on the campus during the course.

Typical Aerospace Workshop Schedule **76 hours**
(conducted on a university campus)

First Week (24 hours)

Monday (5 hrs.)

Registration
Introduction to Workshop
Social-Economic Impact of Aerospace
History of Aviation

Tuesday (5 hrs.)

Introduction to Aircraft
Inspection of Aircraft at Local Airport

Wednesday (4 hrs.)

Theory of Flight
Construction of Models
Model Flight Contest

Thursday (5 hrs.)

Power for Flight
Review and Discussion Period
Introduction of Curriculum Projects

Friday (5 hrs.)

Planning Classroom Field Trips
Helicopters
Aircraft Cockpit Orientation
Local Orientation Flights

Second Week (26 hours)

Monday (5 hrs.)

Critique of Flight Examination
Airports and Airways Navigation

Tuesday (4 hrs.)

Navigation Problems
Curriculum Projects

Wednesday (6 hrs.)

Field Trip to Airline Terminal
Tour Army "NIKE" Site

Thursday (4 hrs.)

Critique of Field Trip
The Atmosphere
Weather

Friday (2 hrs.)

Rules of Flight
Aviation Safety

Saturday (5 hrs.)

Breakfast Flight (Light Aircraft)
Briefing on Federal Aviation Agency
Tour of FAA Air Route Traffic Control Center

Third Week (26 hours)

Monday (5 hrs.)

Critique of Field Trip
High Altitude Flight Phenomena
The Solar System
NASA Spacemobile Demonstration
Rockets and Missiles

Tuesday (4 hrs.)

Human Factors in Space Exploration
Our National Space Programs

Aerospace and Education Trends
Field Trip Briefing

Wednesday (7 hrs.)

Flight to Memphis Naval Air Station
via R5D (DC-6) Type Aircraft
Tour and Briefings

Thursday (6 hrs.)

Briefing and Tour of Technical Training
School
Return Flight

Friday (4 hrs.)

Discussion of Memphis Trip
Examination
Luncheon
Address: You as an Aerospace-Minded Teacher
Report on Projects
Presentation of Certificates

COMPARISON OF IN-SERVICE TRAINING APPROACHES

Figure 1, which follows, establishes some basis for a comparison of the various approaches to teacher training in aerospace education. Eight areas of comparison were selected:

1. Objectives of training
2. Sponsor of training
3. Length and cost of training
4. Training emphasis and content
5. Related experience activities
6. Availability of course-related materials
7. Response required from teachers
8. Effort required to establish and conduct training

An analysis of Figure 1 shows that the workshop program will provide the most satisfactory form of training. It affords a substantial opportunity for the teacher to become acquainted with the broad aspects of aerospace activities and also the techniques for the implementation of aerospace education.

Both the workshop and the extension course, however, are seriously limited as a suitable training technique for teachers within the same community. They depend upon the sponsorship of a college or university and are relatively expensive in time and money. This is especially true if the course is not given locally. Furthermore, sufficient

Figure 1. **COMPARISON OF THE VARIOUS TECHNIQUES USED FOR AEROSPACE EDUCATION TRAINING OF TEACHERS**

	ARTICLES, MATERIALS, AND SERVICES	SHORT PROGRAMS	CONFERENCES AND SEMINARS	INSTITUTES	EXTENSION COURSES	WORKSHOPS
OBJECTIVES	Ta pravide limited infarmatian and guidance. Ta stimulate interest and motivate further inquiry.	Ta pravide limited infarmatian. Ta stimulate interest and mativate further inquiry.	Ta pravide limited infarmation an the several facets af aerospace and its educatianal implicatians. To stimulate interest and mativate further inquiry.	Ta pravide a general intraductian ta aerospace cancepts and the mativational emphasis needed ta intraduce these cancepts inta the classraam.	Ta pravide a single integrated caurse which covers the entire scape af aeraspace concepts and activities. Ta familiarize teachers with materials, resaurces, and teaching techniques needed for the effective introduction af aeraspace concepts inta the classraam.	To pravide a single integrated caurse which cavers the entire scope af aerospace cancepts and activities. Ta familiarize teachers with the materials, resources, and techniques needed far the effective intraductian af aeraspace cancepts into the classroam.
SPONSOR	Aeraspace Centers. Educatianal association. Variaus athers.	Educatianal assaciatian. Lacal schaal system. Organizatians interested in educatian such as FAA, CAP, AFA, NAEC, NASA.	Educatianal assaciatian. State aeraspace educatian cammittee. Organizatians interested in assisting education such as FAA, CAP, AFA, NAEC, NASA. College ar university. Lacal schaal system.	Organizatians interested in assisting educatian such as FAA, CAP, AFA, NAEC, NASA. Educatianal assaciatian. State aeraspace educatian cammittee. Callege ar university. Local schaal system.	Generally, a lacal school system in caaperatian with a college ar university, during the schaal year.	A callege ar university as a regular summer caurse with appropriate credit granted.
LENGTH AND COST	Nat applicable.	One ar twa haurs. Generally, na cost.	Two ta six haurs. Occasianally, a naminal registratian fee—$1.00 ta $2.00.	Six ta fifteen haurs. Occasianally, a naminal registratian fee ta caver those direct casts nat atherwise underwritten — $1.00 ta $3.00.	Six ta eighteen weeks. A sessian each week — ane ta three haurs. Generally, the standard registratian and laboratary fees required far ather extensian caurses.	Twa ta six weeks — three ta six haurs per day. Regular caurse fees, plus raam and baard if commuting is not passible.

PROGRAM CONTENT AND EMPHASIS	Varies from general-interest articles on aerospace to suitable classroam materials, and includes unit and course outlines for specific grade levels.	Usually an infarmatianal program presenting a limited phase af aerospace. The rale of aeraspace education is frequently explained.	Frequently includes several specialized presentations on aerospace activities, a panel discussian ar speaker on educatianal implicatian of aeraspace, and specific techniques far classraam activities.	A comprehensive overview of aeraspace activities and cancepts. Aerospace cancepts are develaped thraugh a pragression of classroam tapics and related experience activities. Emphasis on cantent rather than techniques of implementing aerospace educatian.	A camprehensive overview of aeraspace activities and cancepts. Field trips to assist in re-enfarcing concepts. Emphasis on classroam aeraspace educatian techniques. A textbaak may be used.	A camprehensive overview of aeraspace activities and concepts. Sufficient time far each tapic ta permit same understanding of the technical aspects. Field trips ta assist in re-enforcing cancepts. Emphasis on classroam aeraspace educatian techniques. Intraductian af madel building. A textbaak is frequently used.
RELATED EXPERIENCE ACTIVITIES	None.	None.	Generally none.	Usually an airport visit and an orientation flight.	One or mare field trips to an airport and/ar aerospace related facilities. An arientatian flight.	Twa or more field trips ta airpart and other areaspace related facilities. Flight experience varied ta include small-aircraft as well as a transpart-aircraft flight to tour a distant military ar ather aeraspace related facility.
AVAILABILTY OF COURSE RELATED MATERIALS	Nat applicable.	Nat applicable.	Usually limited in scape.	A variety af selected materials relating ta the presentations.	A braad range af materials relating ta aerospace activities and education. Frequently, special materials af individual interest are made available.	A braad selectian af materials relating to aeraspace activities and educatian. Frequently, materials af lacal interest are available, as well as special informatian and materials fram guest lecturers.
RESPONSE REQUIRED FROM PARTICIPANT	Not applicable.	Nane other than attendance.	Usually nane other than attendance.	Attendance at sessions, including the field trip. Occasianally, an individual class praject is required.	Acceptable attendance at classraam and field trip sessians. (The flight experience is nat mandatary.) Individual praject and examination usually required.	Acceptable attendance and participatian required. (Flight experience participation optianal.) Class presentations, individual projects, and appropriate examinatians as required to meet the established college standards.

Continued on next page

Figure 1 (Continued)

	ARTICLES, MATERIALS, AND SERVICES	SHORT PROGRAMS	CONFERENCES AND SEMINARS	INSTITUTES	EXTENSION COURSES	WORKSHOPS
EFFORT REQUIRED TO SET UP AND CONDUCT COURSE	Not opplicoble.	Arrangements far speoker ot required time ond place.	One ar mare individuols ta assume respansibility as project staff. Arrangements far facilities, including a lunchean. Speakers contacted and necessory orrangements made far their presentotions. Pragroms printed and participants properly natified.	Several individuals far a project staff ta caardinote program, facilities, speakers, field trip, ond orientation flights. Hondaut moterials selected ond ordered. Programs printed ond participonts praperly notified. Consideroble advonce plonning and fallaw thraugh required.	Some advonce preporotion required as far any extensian caurse, with the additionol respansibility of arranging for guest speakers, field trips, ond orientation flights.	Some advonce preparotian required as far ony college warkshap pragrom, with the additianol respansibility of orranging far and caardinoting guest speokers, field trips, and flight experiences.
SIGNIFICANT DISADVANTAGES	Reliance upon the initiotive and insight af the individuol teacher. Unless an averview af oeraspoce is understaad, impraper classraam emphosis moy result.	Very limited informatian and understonding achieved. Often tokes the form af a "shaw" resulting in superficiol knawledge.	Presentotions aften limited in scape ond frequently emphosize only a single phose af oerospoce. (Nate: This is aften deliberately plonned; e.g., NASA Briefing.)	The time allacotian for eoch topic allows only basic concepts ta be developed. Pragrom requires consideroble effort in plonning ond executian by severol individuols. Attendonce required at severol sessions.	Spansarship af callege or university generally required. Considerable plonning necessary. Caurse requires attendance aver on extended periad af time.	Warkshap aften held at distant college ar university; time and expense moy preclude a teacher's ottendonce. Closs registrotion usually limited.
SIGNIFICANT ADVANTAGES	Availoble withaut participatian in orgonized octivity. Wide voriety af form and purpase available free or at law cost (frequently, in classraam quantity).	Program easily arranged. Suitoble far a large number af teachers. Effective in stimuloting interest.	Usually spansarship by an orgonizatian with oerospoce educotian abjectives. Several focets af oeraspace ond same related clossraam concepts discussed. Limited selection af "carry hame" moterials aften ovoilable. Single attendonce required. Special conferences far individuals octive in oerospoce educatian provide the apportunity far new infarmotian, stimuloting, and caardinatian af activities.	Braod averview af oeraspace provided ond re-enforced by selected experience. Participotion time limited. Intraduction ta local oerospoce resaurces emphosized. Technique designed ta be bath motivotianal and infarmative.	Broad averview af oeraspoce systematically developed, with same understonding beyond basic concepts. Textbook may be used. Selected experience octivities used ta reenforce lectures. Projects useful ta the individuol moy be developed. College credit usuolly granted.	Braad averview af oeraspoce systematicolly developed, with some understonding beyond basic concepts. Lectures re-enforced thraugh extensive reloted experience octivities. Opportunity ta became acquainted persanolly with mony resource individuols. Projects useful to the individual ore developed. College credit granted.

flexibility in programming to acquaint all participants with their local aerospace resources is not usually possible. Only occasionally are the specific aerospace education needs of a community related to its own local aerospace activity.

The institute approach would appear to be the best compromise for community use. It allows sufficient time for a comprehensive program, has flexibility, and is not too demanding upon either the teacher's time or resources.

The Illinois Aerospace Institute Plan

DESIGN

The initial Illinois Aerospace Institute was designed in 1958 as a short and nontechnical introduction to the "world of aerospace." It provided the participants with an adequate knowledge of aerospace activities so that they were able to meet, with some depth, everyday questions in the classroom.

The Illinois technique was deliberately designed for use by the local community in its effort to capitalize on those aerospace education resources which were readily available in the community. This is contrary to the attitude frequently taken that such a program's success and value is dependent upon nationally recognized speakers or well-known aerospace facilities. Although such factors will admittedly contribute to an effective program, there is much to support the Illinois institute's "localized" approach.

One final consideration in the design of the Illinois institute was the development of a general format which would allow laymen knowledgeable in aerospace matters, but not professional educators, to contribute effectively to the in-service training of the community's teachers.

Although no claim is made that the Illinois institute technique is a better approach to in-service teacher training than other techniques, there is a degree of uniqueness and flexibility in its design which seems to lend itself to success in a number of varied in-service training situations.

EDUCATIONAL OBJECTIVES

The specific educational objectives of the Illinois Aerospace Institute come within the framework of the generally accepted objectives of aerospace education. These objectives are:

1. To provide the teacher with a sufficient understanding of the basic concepts and impact of aerospace upon our lives so that

he will have confidence in introducing aerospace education into the classroom. This understanding should include
   a. A sufficient reading and speaking vocabulary of aerospace to understand and discuss current aerospace events,
   b. A general knowledge of aerospacecraft and the simple scientific principles related to their use, as well as an understanding of the environment of aerospace flight,
   c. An introduction to the broad social, economic, and political implications of aerospace activities.
2. To identify and familiarize the teacher with some aerospace education materials, personnel, and other resources.
3. To introduce the teacher to the local aerospace-related facilities.
4. To provide a flight experience.
5. To motivate the teacher in capitalizing on the contemporary interest of children in aerospace in their classroom situations.

The institute does not attempt to instruct the teacher in techniques of introducing aerospace education concepts into the classroom; rather, it is assumed that the participant, as a professional educator, will utilize the information, experience, and materials acquired to enrich his individual classroom curriculum.

Recommended Procedures of Operation of an Institute

The procedures for establishing an institute will vary with the individual community and school system. In some instances, a qualified individual is available within the school system to initiate planning. In other instances, an individual from an organization associated with aerospace education — such as a state aerospace education committee, a department of aeronautics, the Air Force Association, or the Civil Air Patrol (which has many professional educators serving as volunteers) — may be relied upon for guidance and assistance or even complete sponsorship of the institute.

The director of the institute, preferably, should be an educator from the school system. However, this is not essential to the success of the institute.

The initial planning should include decisions regarding the following items:

1. *For whom is the institute designed?* It may be intended for all the teachers within a school system or it may be limited to elementary teachers only or to high school teachers.
2. *Is any special emphasis desired for the institute?* Generally, the

basic over-all plan is followed. Occasionally, science or social studies emphasis will be requested.

3. *Will there be provisions for credit allowance for salary schedule purposes?* Frequently a personal project is required in addition to regular attendance if the institute is recognized with credit provisions.
4. *Will there be a fee?* A nominal fee is sometimes required to cover costs incurred such as for transportation, special materials, coffee, rolls, etc.
5. *What should be the size of the class?* This is not a major factor so long as it does not exceed the facilities available. The experience to date tends to indicate that approximately fifty participants is an optimum number.
6. *What should be the method of teacher notification and selection?* This will vary with the school system and may frequently include local newspaper publicity arrangements.
7. *What should be the dates of the institute?* The dates must be established to allow sufficient time for the arrangement of speakers, materials, and other necessary activities. A minimum of six weeks is desirable.

The institute design requires careful use of the time available. It must be well planned and conducted in a highly organized manner, including seemingly minor details.

The meeting facilities should reflect an aerospace atmosphere whenever possible. If the local airport or aerospace installation has suitable space available, this would be a very desirable meeting place. An ordinary classroom or auditorium can be given considerable atmosphere by displaying airline posters, photographs, charts, and other materials relating to the topics. Small display items are sometimes easily obtained from the local United States Air Force offices, aircraft manufacturing firms, aircraft dealers, and countless other sources. Often the speaker will make available display items pertaining to his particular area of interest if sufficient notification is given.

The specific topics as outlined in sequence in Figure 2 appear to provide the most desirable pattern. Frequently, however, it is necessary to rearrange the topics to fit an individual speaker's availability and/or to include additional topics. Occasionally the local situation may dictate an additional special interest topic, but this does not appear to be of major concern to the over-all success of the institute. Each participant should be provided with a printed schedule, including pertinent instructions, prior to the start of the institute.

Figure 2. **ILLINOIS AEROSPACE INSTITUTE DESIGN**

SESSION	TOPIC	DESCRIPTION	TIME ALLOCATED	RECOMMENDED METHOD OF PRESENTATION
1	INTRODUCTION	Explain objective of institute.	5 minutes	
A	IMPACT OF AEROSPACE	Develop basic concepts in the field of aeraspace. Describe the social-ecanamic impact of aviation, the rapid shrinkage of the world in terms of time, the nearness and interdependence of the earth's peaple, and the impartance of arerаspace as a majar industry — especially in view of the vast research and develap-ment required far military and space applications — as well as the relationship af these items ta aur everyday lives.	40 minutes	Give a basic lecture supplemented with a film clip ta illustrate the impact and personal meaning af high-speed jet travel.
B	HISTORY OF FLIGHT	Discuss the evalutian af aviatian from the ballaan ta the space vehicle. Trace the dynamic growth and maturing af aviatian and the evalutian af man's changing behaviar due ta the rapid travel made passible by aviation.	25 minutes	Shaw Disney's film "History af Aviation," which is available fram film rental libraries.
C	VEHICLE FOR FLIGHT	Discuss the airplane as a vehicle. Identify its parts and func-tians of utility, mability, pawer, lift, and stability cantral. Em-phasize the common characteristics af different-laoking aircraft.	20 minutes	Give a chalk-talk, listing functians and showing pictures af the parts which fulfill the functions. (An aircraft model may be adequate far chalk-talk). Use a simple stick madel ta paint aut the five functions of its parts; fly it to climax talk.
	BREAK	Encaurage informal discussion and questions regarding preceding topics.	10 minutes	
D	FLIGHT PRINCIPLES	Reduce ta everyday language the principles by which aircraft fly. Explain the forces of lift, gravity, thrust, and drag, as well as the equilibrium of these farces.	25 minutes	Give an illustrated presentatian using a simple model airplane, blackbaard, and simple demanstrations af basic scientific prin-ciples.
E	MAN IN FLIGHT	Present a nontechnical discussian af the effects af increasing altitudes and speeds an man and the techniques and equipment used to suppart life in flight.	30 minutes TOTAL 2 hrs. 30 mins.	Invite an Air Force, Navy, ar Reserve pilat to present this section, using his personal pratective flight gear.
2F	POWER FOR FLIGHT	Cover briefly the fundamental principles af the aeraspacecraft powerplant. Explain conventional, jet, and rocket engines and the principles af the propeller.	30 minutes	Use models, drawings, and a film such as General Motor's "ABC'S af Jet Prapulsion."

G	THE WEATHER	Explain the elementary principles of weather and show what weather means to aviation. Describe the Weather Bureau and its services.	30 minutes	Make a presentation supplemented with blackboard drawings which show how weather moves and what causes it. Use weather charts available from the U. S. Weather Bureau.
	BREAK	Encourage informal discussion and questions regarding the preceding topics.	10 minutes	
H	ROCKETS, MISSILES, AND SPACE	Describe the rocket launch vehicle and missile as machines and vehicles of space. Explain why man is going into space and some of the problems encountered. Discuss satellites and orbits, as well as the benefits of space travel research — both that taking place today and that being planned for tomorrow. Review current and planned space vehicles.	95 minutes TOTAL 2 hrs. 45 mins.	Develop the topic by use of models available in hobby shops. Simple "ball and string" demonstrations may be used to illustrate the orbit principle. The Disney film, "Man in Space," is excellent as are the many others available from NASA and the USAF. If available, the NASA "Space Mobile" lecture-demonstration or slide-lecture is outstanding.
31	NAVIGATION	Explain in everyday language how a pilot finds his way in the sky. Show how maps, compasses, and radio instruments are used. Discuss the wind's influence.	35 minutes	Give each student an aeronautical chart and then go through a typical flight plan to show how checkpoints and the compass are used. Post illustrative maps and charts on the board.
J	AIRPORTS AND FACILITIES	Discuss briefly the facilities for flight, emphasizing airports, airways, and electronic aids and include such items as radio, radar, fueling, and servicing. Explain the role of the local airport.	20 minutes	Give a lecture explaining the events in a typical flight in a manner which ties the many factors of this topic together.
K	OPTIONAL TOPIC	Present a topic of local interest or hold an informal discussion of preceding topics.	30 minutes	A talk may be given about the community's unique aerospace facility or activities; for example, a soaring club, a defense installation, a local manufacturer, or a research laboratory.
	BREAK	Encourage informal discussion and questions regarding preceding topics.	15 minutes	
L	RESOURCES AVAILABLE TO THE TEACHER	Report on available aerospace information such as printed materials, films, periodicals, and other aids. Discuss assistance which may be obtained from individual speakers and organizations such the Civil Air Patrol, National Aerospace Education Council, airlines, aerospace industries, state aerospace education committees, etc.	40 minutes	Have handouts and sample copies on hand to stimulate the interest of the participants, as well as order blanks and membership applications.
M	BRIEFING ON AIRPORT VISIT	Explain the purpose of the airport tour and flight experience. Emphasize its relationship to the institute lectures.	10 minutes TOTAL 2 hrs. 30 mins.	Diagram the airport facilities and distribute a check list of pertinent items to be looked for, both before and during the orientation flight.

Continued on next page

Figure 2 (Continued)

SESSION	TOPIC	DESCRIPTION	TIME ALLOCATED	RECOMMENDED METHOD OF PRESENTATION
4N	AIRPORT VISIT	Make a group tour of a local airport, if possible visiting a static display of aircraft, the control tower, the weather station, an airliner, etc. A flight experience in a light aircraft will enhance the understanding of institute concepts.	Approximately 3 hours	Since the topics previously covered are tied together through the experiences of this field trip, it will make an excellent review.
O	YOU AS AN AEROSPACE-MINDED CITIZEN	Review the place of the participant as an informed teacher, citizen, and consumer in today's America. Emphasize the fact that the informed citizen is the keystone of aerospace power. Present certificates.	30 minutes TOTAL 3 hrs. 30 mins.	Give a "wrap up" talk which stresses the utility of what has been presented during the institute. Award CAP Certificates of Accomplishment to participants.

TOTAL SESSIONS — 4 TOTAL TOPICS — 15 TOTAL TIME — 11 hours 15 minutes

While limited, the time for each topic will be adequate if the high points are emphasized and the technical details are eliminated. It is necessary that the speakers be properly briefed and oriented as to their part in the institute. This maintains the continuity and reduces repetition of subject matter. It has been observed that a speaker must be well prepared to cover his topic effectively within the time limitation. A deliberate interchange of speakers, films, and demonstrations will minimize the fatigue factor for the participants. Smooth and rapid transitions are necessary to conserve time.

Coffee breaks should be organized to give the participants an opportunity to ask questions and to meet the speakers informally.

The presentations will be re-enforced if the speakers and films are supplemented with pertinent handout materials suitable for classroom use. There is an abundant supply of free or low-cost materials available from numerous sources. A few carefully selected items to be reviewed between meetings are preferable to a large number of overlapping items. Care is required to see that these items are distributed in a manner which will not distract from the oral presentations. Examination copies of other inexpensive materials and aids will provide the teacher with further exposure to available materials.

Most institute directors do not require any type of examination at the close of the classroom activity. If credit is granted for institute participation, the submission of individual projects is often requested.

The airport visit and the flight experience might be considered as the laboratory session of the institute. Many benefits can be derived if this experience is well planned and conducted. Aerospace activities can be observed in operation, whether at a large military or civilian installation or a small community airport. Special field trips to local laboratories or manufacturing firms involved in aerospace activities have occasionally been planned to supplement the airport visit.

The small four-place airplane probably offers the most interesting flight experience, although any type of aircraft can be used effectively. In the small airplane the teacher has a more intimate experience with the cockpit, and he can observe better the effects of the controls upon the flight, watch the instruments, and question the pilot. An informal walk-around inspection of the airplane with the pilot prior to the flight is certainly desirable and informative. A thirty-minute flight is sufficient for orientation purposes. Usually, the Civil Air Patrol or local airport manager will arrange the flights either gratis or at a nominal cost.

The field trip experience tends to translate the classroom lectures into a more meaningful context and is generally considered the insti-

tute's high light. An appropriate certificate, such as the Civil Air Patrol Certificate of Accomplishment, denoting the teacher's successful completion of the program adds to the prestige of the institute. Many teachers proudly display such certificates on their classroom walls as an indication of their interest in and knowledge of this relatively new segment of the field of education.

The Library of Congress has cataloged this publication as follows:

Library of Congress Catalog Card Number: A64-7075

Johnson, Raymond J.
Aerospace Education Workshops and Institutes
Urbana, Illinois, 1964.
Institute of Aviation
1964 January

(University of Illinois Institute of Aviation, Bulletin Number 24)

1-17-64

THE INSTITUTE OF AVIATION, established in 1945 as the Institute of Aeronautics, is operated as the administrative agency responsible for the fostering and correlation of the educational and research activities related to aviation in all parts of the University of Illinois. Other functions include academic instruction, flight training, management of the University of Illinois-Willard Airport, and aeronautical research.

In connection with the latter function, the Institute issues two types of publications: first, a group of reports on research results, and second, a series of bulletins on aviation subjects of an extension-service nature to the citizens of the state.

The following publications are presently in print:

BULLETIN 6: Lightplane Tires on Turf and Concrete, 1949.

BULLETIN 19: Flight Experience Course for Teachers and Businessmen, 1956.

BULLETIN 20: When Classroom Teachers Learn to Fly, 1958.

BULLETIN 21: Flight and Preflight Curricula, 1958.

BULLETIN 22: Labor Relations in the Air Transport Industry, 1947–1957, 1958.

BULLETIN 23: Aviation Ground Instructor Curriculum, 1962.

BULLETIN 24: Aerospace Education Workshops and Institutes, 1964.

UNIVERSITY OF ILLINOIS-URBANA
3 0112 050244992